What is claimed is:

1. A reconfigurable modular microfluidic system comprising:

a) an alignment base comprising a plurality of wells;

b) a plurality of microfluidic modules having a shape which corresponds to a shape of the wells, further comprising a plurality of fluid communication ports located around a periphery of the microfluidic modules;

such that the microfluidic modules fit into the wells of the alignment base and the fluid communication ports in each microfluidic module overlap adjacent microfluidic modules in at least one location, the overlap allowing the fluid communication ports of adjacent microfluidic modules to be aligned with each other such that there is a direct fluid connection between adjacent microfluidic modules; and

c) a cover plate operatively connected to the alignment base, such that when the cover plate is mated with the alignment base, pressure is applied at each periphery location of the microfluidic modules, such that a leak free chip-to-chip seal is formed.

2. The system of claim 1, wherein fluidic access to at least one external device is possible at every fluid connection.

3. The system of claim 2, wherein the wells have a hole, which permits fluid communication to the fluid communication ports in the microfluidic modules through the alignment base.

4. The system of claim 3, wherein the holes are located in at least one corner of the wells.

5. The system of claim 2, wherein the cover plate has a plurality of holes, which permits fluid communication to the fluid communication ports in the microfluidic modules through the cover plate.

6. The system of claim 1, further comprising optical access to every microfluidic chip, wherein the optical access allows for fluid visualization or molecular detection on each chip.

7. The system of claim 6, wherein the cover plate comprises a plurality of apertures which provide optical access to the microfluidic modules.

8. The system of claim 6, wherein the alignment base further comprises a plurality of apertures which provide optical access to the microfluidic modules.

9. The system of claim 1, wherein the system is reconfigurable.

10. The system of claim 1, wherein the microfluidic modules further comprise an optically transparent lid, wherein the optically transparent lid is positioned to provide optical access to the microfluidic modules.

11. The system of claim 1, wherein the modules are selected from the group consisting of:

a) functional modules, each performing a specific function;

b) logic modules, directing a flow of fluid to a desired location;

c) ingress/egress modules, providing a plurality of inlets and outlets for fluid in the system; and

d) a combination of any of the above.

12. The system of claim 11, wherein the functional modules perform a biological or chemical function.

13. The system of claim 11, wherein the logic modules comprise an equal path length from fluid communication port to fluid communication port, such that the logic modules achieve a pressure balanced fluid flow.

14. The system of claim 11, further comprising at least one capillary tube which provides fluid to at least one ingress/egress chip.

15. The system of claim 11, wherein the functional modules are selected from the group consisting of:

a) a mixer;

b) a liquid chromotagraphy column;

c) a flow cell for use with a ultraviolet spectrometer;

d) a liquid extraction column;

e) a micropump;

f) a heater;

g) an electrospray apparatus;

h) an electrophoresis apparatus;

i) at least one reservoir;

j) at least one reactor;

k) at least one sensor; and

l) any combination of a) through k).

16. The system of claim 1, wherein the microfluidic modules have a substantially square shape, such that the fluid communication ports are located at least at the corners of the microfluidic modules.

17. The system of claim 16, wherein the microfluidic modules are arranged in a diagonal array such that only one corner of adjacent microfluidic modules overlap.

18. The system of claim 1, further comprising a seal at each fluid communication port.

19. The system of claim 1, wherein each microfluidic chip further comprises at least two layers.

20. The system of claim 19, wherein at least one of the layers is patterned with a pattern selected from the group consisting of:

a) at least one fluid passageway;

b) at least one feature of microfluidic architecture;

c) at least one fluid communication port; and

d) any combination of a), b), and c).

21. The system of claim 20, wherein the fluid communication ports are normal to a surface of the layers connecting to the microfluidic architecture.

22. The system of claim 19, wherein the layers are sealed together and form a microfluidic structure.

23. The system of claim 1, wherein the wells in the alignment base comprise a plurality of deep wells and a plurality of shallow wells.

24. The system of claim 23, wherein the plurality of deep wells alternates with the plurality of shallow wells.

25. The system of claim 24, wherein the fluid communication ports of the microfluidic modules located in the deep wells are aligned underneath the fluid communication ports of the microfluidic modules located in the shallow wells.

26. The system of claim 1, wherein at least one component of the system is fabricated by a method selected from the group consisting of:

a) ion-milling;

b) plasma etching;

c) reactive-ion etching;

d) deep reactive ion etching; and

e) any combination of a) through d).

27. The system of claim 1, wherein the shape of the microfluidic modules comprises a consistent shape.

28. The system of claim 27, wherein the shape of the microfluidic modules is selected from the group consisting of:

a) a square shape;

b) a triangular shape;

c) a rectangular shape;

d) a hexagonal shape; and

e) a circular shape.

29. The system of claim 27, wherein the shape of the microfluidic modules is a regular polygon.

30. The system of claim 1, wherein the fluid communication ports are located on at least one side of the microfluidic modules.